

## **Exospheric Hydrogen Density Determined from Lyman- $\alpha$ Irradiance**

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We use extreme ultraviolet (EUV) measurements of solar irradiance from GOES satellites to derive daily hydrogen (H) density distributions of the terrestrial upper atmosphere. GOES satellites are in geostationary orbit and measure solar irradiance in a wavelength band around the Lyman-alpha line. When the satellite is on the night-side of the Earth looking through the atmosphere at the Sun, the irradiance exhibits absorption/scattering loss. Using these daily dips in the measured irradiance, we can estimate a simple hydrogen density distribution for the exosphere based on the integrated scattering loss along the line of sight towards the Sun. We show preliminary results from this technique and compare the derived exospheric H density distributions with other data sets for different solar, geomagnetic and atmospheric conditions. The GOES observations will be available for many years into the future and so potentially can provide continuous monitoring of exospheric H density for use in full atmospheric models. Such measurements may be useful to better understand upper atmospheric coupling, to monitor impacts of climate change, to study the decay of the ions in the magnetospheric ring current during geomagnetic storms, and to improve satellite drag models. We will also discuss planned improvements to this technique.